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Westminster College Bulletin

VOLUME THREE

MARCH, 1910

NUMBER FOUR

1852

Departments of Science

The Summer School of 1910

Entered at New Wilmington, Pa., as Second Class Matter
under Act of Congress of July 16, 1894, or June 6, 1900.

Main College Building

Erected 1862

Enlarged 1906–7

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CALENDAR

ACADEMIC YEAR, 1909—1910.

Sept. 13, 14, 9 A. M. and 2 P. M.	Entrance Examinations.
Sept. 15, Wednesday, 2 P. M.	First Semester begins.
Nov. 25, Thursday,	Thanksgiving Day, a holiday.
Dec. 17, Friday,	Holiday Recess begins.
1910.	
Jan. 4, Tuesday, 8:15 A. M.	Recitations resume.
Jan. 25, 29,	First Semester Examinations.
Feb. 1, Tuesday,	Second Semester begins.
March 25, Friday,	Spring Recess begins.
April 5, Tuesday, 8:15 A. M.	Recitations resume.
June 7, 8, 9, 10,	Second Semester Examinations.
June 12, Sabbath	Baccalaureate Services.
June 16, Thursday,	Commencement.
June 17, 18,	Entrance Examinations.
June 21, Tuesday,	Opening of seven weeks Summer School.

ACADEMIC YEAR, 1910—1911.

Sept. 12, 13,	Fall Entrance Examinations.
Sept. 14, 2 P. M.	First Semester begins.

FACULTY

ROBERT McWATTY RUSSELL, D. D., LL. D.
President and Professor of Christian Evidences.

ROBERT GRACEY FERGUSON, D. D., LL. D.
Professor of Biblical Literature and Ethics.

JOHN JAMES McELREE, A. M.
Professor of Latin.

CHARLES FREEMAN, Ph. D.
Dean and Professor of Chemistry.

JOHN ABRAM SHOTT, A. M.
Professor of Physics and Department Instructor in Psychology and Education.

JAMES OSCAR CAMPBELL, A. M., D. D.
Professor of History and Political Science.

JAMES McALLISTER SHAFFER, A. M.
Professor of Mathematics.

WILLIAM TEMPLETON HEWETSON, A. M.
Professor of English.

JAMES DEURUELLE BARR, A. M.
Professor of Greek.

ANNA HEYBERGER, A. M
Professor of French and German.

WILLIAM W. TROUP, A. M.
Associate Professor of Latin and Greek.

ELIZABETH LAWRENCE RANDALL, B. O.
Professor of Oratory.

SARAH A. PRATT, A. B.
Dean of Women.

BENJAMIN WILLIAMS BRIDGMAN, A. M.
Associate Professor of Physics and Mathematics.

OWEN W. MILLS, A. M.
Professor of Biology and Geology.

EDWIN LONG BECK, A. B.
Assistant Professor of English.

BERTHE MULLER,
Assistant Professor of French and German.

BESS STEWART, A. B.
Instructor in English.

WILLIAM WILSON CAMPBELL, A. M.
Director of Music, Pianoforte and Vocal Culture.

NONA YANTIS, B. S.
Instructor in Pianoforte and Harmony.

EDWARD FRENCH HEARN,
Instructor in Pianoforte.

CLARA LOISE SHAFFER,
Instructor in Vocal Culture and Ensemble.

LUIGI VON KUNITS,
Instructor in Violin.

LUCIE M. MANLEY,
Director of Art.

J. H. VEAZEY, A. M.
Registrar and Local Treasurer.

ALBERTA BUDD,
President's Secretary and Assistant Registrar.

WILLIAM TEMPLETON HEWETSON, A. M.
Librarian.

MARGARET EARLA MITCHELL,
Assistant Librarian.

THE SCIENCES AT WESTMINSTER

The development of Science at Westminster has been one of the characteristic features of her growth. At the first, everything taught was included in one comprehensive department of Natural Science, at the head of which for twenty-five years and more stood Prof. J. B. Cummings of honored memory. He came to the college in 1858 and was a tower of strength in all those early years of his life. He was an all-around man, capable of teaching almost any branch of the curriculum, and if titles of his chair give a correct impression, he was assigned more than any one man should be expected to do. At first he was "Principal of the Scientific Department." In 1864 he was announced as "Principal of the Scientific Department and Professor of Chemistry, Natural Philosophy and Geology." In 1870 he became "Professor of Natural Science." The whole realm of physical things was thus included in his domain, and the wonder is that he could have done so many things and in so efficient a way. Truly, he served his generation well.

THE DEPARTMENT OF CHEMISTRY

The first differentiation which came in the realm of Science began with Chemistry in 1878. In this year the college found it necessary to recognize the importance of the Science of Chemistry in the industrial world, and created a special department for it. Prof. R. O. Graham of Butler, a graduate of Amherst College, was chosen "Instructor" in the new department, and a little later became a full professor. He proved to be the right man for the place, and laid the foundations of his department on broad lines. He was thorough, resourceful and competent, and the work took high rank from the very beginning. The catalogue of the first year announced:—"A new room and laboratory have been fitted up in the third story of the college building, and upwards of five hundred dollars' worth of apparatus has been placed in it."

In the summer of 1884 the building known as the gymnasium was transformed into a laboratory which served its purpose well in its day. The next catalogue says: "The new chemical rooms were completed during the summer. They are supplied with gas and water and are fitted in the latest approved style. They consist of a lecture room, private laboratory for quantitative work and students' laboratory for qualitative analysis. While other laboratories may be more extensive, none will be found better fitted for non-metallic experiments and for qualitative and quantitative numeral analysis."

Prof. Graham remained with the college until the close of the year 1887 when he accepted a position with higher salary in another institution. During the college year of 1887-88 Prof. W. A. Frankboner was instructor in the department, proving himself a young man of fine ability.

In 1888 Prof. John A. Swan was made Professor of Chemistry and Mathematics, which position he held for three years, resigning to continue his studies in Johns Hopkins. At present he holds the position of Professor of Chemistry in Monmouth College.

In 1891 Prof. E. P. Thompson was called to the chair in which he remained until 1893 when he was chosen to a similar position in Miami University.

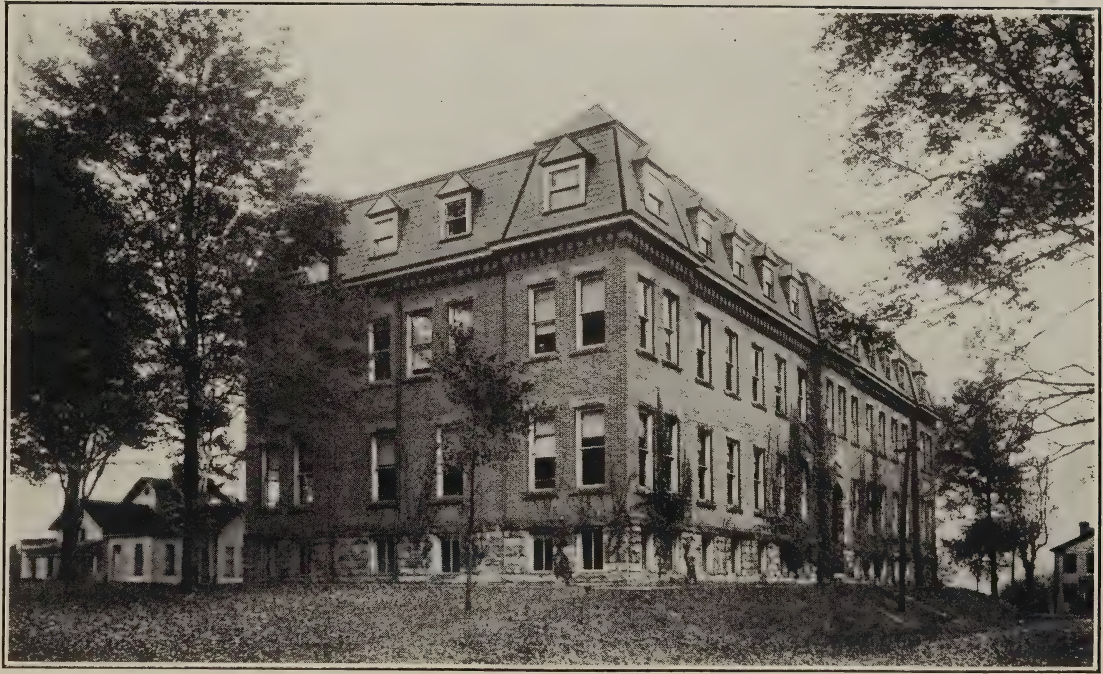
In 1893-94 Prof. Arthur J. Hopkins, Ph. D., was in charge of the department, returning at the end of the year to Amherst College, his Alma Mater.

In September, 1894, Prof. Charles Freeman, Ph. D., a graduate of Allegheny College and graduate student of Johns Hopkins, was elected Professor of Chemistry and for sixteen years has been the efficient head of this department. All the men of this succession have been able men, continuing the work of their predecessors in a very efficient way. Dr. Freeman, however, by his breadth of knowledge, enthusiasm and efficiency as a teacher, with his insistence on the complete fulfillment of every task, has made the department peculiarly his own. His mark is upon it, and work done under his supervision not only commands respect at home but receives credit abroad in the first educational institutions of the land and in the laboratories of industry where his students serve.

In the summer of 1895 the "Clark Chemical Laboratory" was built. The credit of this is due not only to the generous donor, whose name it bears, but to Prof. S. R. Thompson, whose example in giving funds for the "Mary Thompson Science Hall" and personal solicitation secured the generous gift of Colonel Clark.

THE DEPARTMENT OF PHYSICS

The Department of Physics as now existing is an offshoot from the comprehensive Department of Natura Science originally under the care of Prof. Cummings. The differentiation which began with Chemistry in 1878 was further extended when the distinctive Department of Physics was instituted in 1884 and Prof. S. R. Thomp-



Mary Thompson Science Hall
and The Clark Chemical Laboratory

son, Ph. D., placed at its head. Prof. Thompson came to the college with the prestige of a successful career behind him, as Principal of Agricultural College in connection with the State University of Nebraska, and afterwards as State Superintendent of Public Instruction of Nebraska. He came also with sincere love for his Alma Mater and intense enthusiasm for his chosen work. At once he set his face toward enlargement, and year by year his ideals were more fully realized. In his first year Biology was added to the course with the reason given—"that students may be qualified to read intelligently the rapidly increasing literature of this important science, and at the same time to become better able to estimate at their true value the specious arguments against the validity of revealed religion, which have been by some supposed to be found in the science of physical life." In the next year he added a thousand dollars' worth of apparatus, the larger part of it manufactured in the college by his own hand. In 1889 he announced "The physical apparatus now belonging to the college will permit the exhibition of three times as many experiments as are described in any text book." Then followed laboratory work with a considerable quantity of apparatus for this, and as the crown of his persistent endeavor came the "Mary Thompson Science Hall" erected in 1893 from funds furnished by himself and according to plans prepared by himself, thereby greatly increasing the facilities for instruction in Physics and kindred departments, and providing for them a permanent and adequate home.

Prof. Thompson was an independent, progressive, versatile Christian man, and the impulse he gave to scientific study abides and grows. He passed away in 1896, a year made memorable by the loss of two great men—Professors Mitchell and Thompson—and was succeeded in 1897 by Prof. Rolla Roy Ramsey, in 1898 by Prof. George Cumming McKee, and in 1899 by Prof. Isaac Newton Moore. The latter continued with the college for three years when he was recalled by increased salary to Slippery Rock State Normal School from which he came. There was nothing to cause his departure from Westminster save the greater attractiveness of the position to which he was called.

In 1902 Prof. James Abram Shott, A. M., entered upon his work, and has continued until the present time as head of the department. Prof. Shott was graduated from Ohio University, and received his Master's Degree at Harvard. After a year's teaching in Carthage College he entered the work of Westminster. This work has been characterized by thoroughness and enthusiasm. Few men are as broad in their knowledge and as widely read upon different phases of the educational life. This fact has occasioned the assignment to him of a generous share of work in Philosophy and Education, and is likely to result in his transfer to the headship of a department bearing that name. The coming of Prof. Benjamin W. Bridgman, A. M., from the University of Wisconsin as the Associate of Prof. Shott prepares the way for the continued excellence of the work done, Prof. Bridgman being admirably fitted both in attainment and teaching ability for the responsibilities of developing and carrying on the work.

THE DEPARTMENT OF BIOLOGY

To Prof. Shott must be granted the credit of so emphasizing the work of Biology as an adjunct of his department so as to make necessary the organization of a special department of Biology and the securing of a Professor for its work. As a result of the breadth and intensity of his work, a chair of Biology and Geology was established in the spring of 1906 and Prof. Arthur Day Howard, Ph. D., elected to that chair. Prof. Howard was graduated from Amherst, received his Master's Degree at Northwestern University and his Ph. D. from Harvard. For two years he conducted the work of his department with painstaking care and enthusiasm. Laboratory equipment was greatly enlarged under Dr. Howard, and his reputation as a careful leader in laboratory work established in a large way. Receiving a flattering offer from the University of Washington, his relations with Westminster were terminated.

Dr. Howard was succeeded in September, 1908, by Prof. Owen W. Mills, M. A., a graduate of Clark University with Master's Degree from the same institution. His preparation for work was secured under the instruction of the eminent Dr. C. F. Hodge of international fame in matters of Biology and Zoology. Under Prof. Mills the Biological laboratory has become one of rare completeness, while the character of the work done prepares for the advanced work of the professional schools, and best of all adds a zest to living through the development of powers to observe and appreciate the beauty and wisdom of life functions about us.

GENERAL ENLARGEMENT

The development of Scientific instruction at Westminster into separate departments has been followed also by the strengthening of the Scientific Course in the element of time. Until the year 1889 the Scientific Course was shorter by two years than the Classical. In that year the "New Scientific Course" was announced, adding a year to what had been previously required. In 1895 a further advance took place, when the Scientific Course was made a full Four Year Course, equal to the Classical in time requirements, scientific and mathematical studies being substituted for Greek.

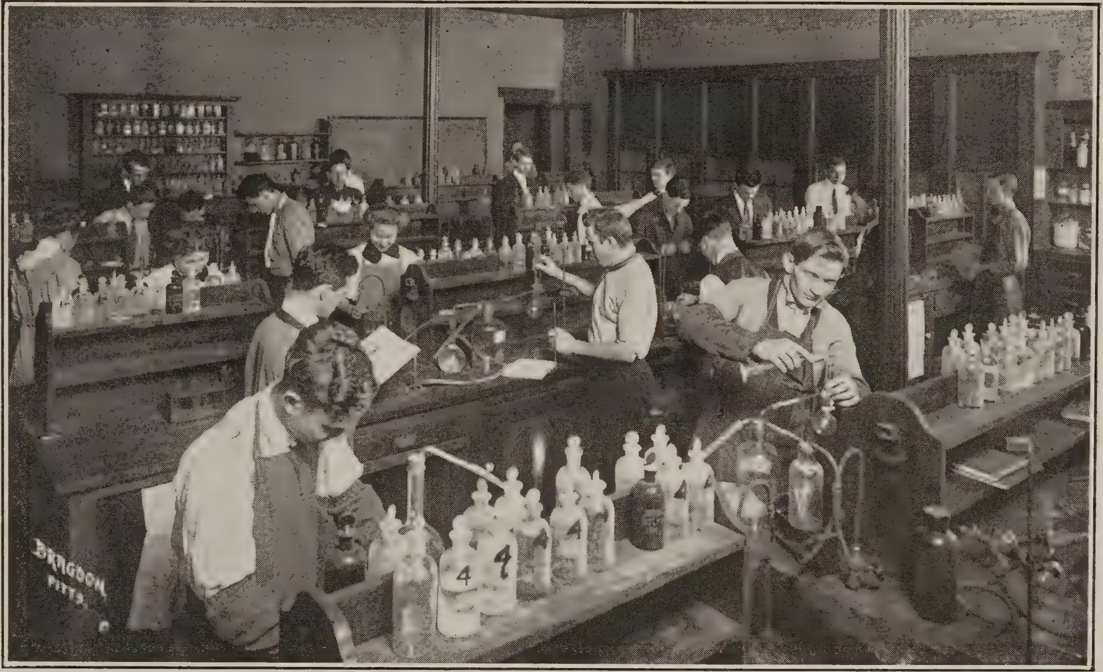
GENERAL REVIEW

That patrons and friends of the institution may have a fuller view of what is being accomplished in the realm of Science at Westminster, this bulletin is devoted especially to subjects thus correlated. That the matter may stand out clearly, notices of departments and outlines of courses are presented as prepared by the professors of these departments.

ASTRONOMY

PROFESSOR FREEMAN

The fact that many of our colleges are beginning to place unusual stress on the course in general astronomy may be taken to mean that the colleges consider a knowledge of this subject to be a *sine qua non* of the educated man or woman. Colleges that a few years ago were devoting but one or two hours a week to general astronomy and that were putting the students of this subject in charge of young and inexperienced instructors, are



Chemical Laboratory

General Chemistry

now devoting three or even four hours a week to the subject and placing it under the direction of men thoroughly equipped to teach it. That the young men and women of our colleges have come to recognize the value of a knowledge of astronomy, is abundantly evidenced by the increasing numbers that every year enroll in astronomy courses.

The value of astronomy to the student is a threefold value; viz., a practical value, a cultural value, and what may be called an inspirational value.

The practical value of astronomy for the college graduate is due in part to the fact that nowadays the world is full of men and women who are interested in astronomy and have, in many instances, considerable elementary knowledge of the science. As a result, the facts of astronomy enter more or less into their daily thinking; and the minister who would preach to them, the editor who would write for them, the teacher who would direct their thought—each must possess an adequate knowledge of that subject that enters so freely into their lives. The practical value of astronomy for the physicist, indeed for the general scientist, for the agriculturist, and for the engineer, is so evident that it need not be commented on.

The cultural value of astronomy is evident to every man and woman capable of giving the matter a moment's serious thought. All the great literature of the world from the age of Homer to that of Shakespeare is rich in astronomical allusions. It is clear that he who would read the writings of the masters of all ages in such a way as to get from them all that their authors meant to put into them by astronomical allusions, must have had adequate instruction in the science of astronomy.

Furthermore, our present day literature, whether it be newspaper or magazine, science, history, book of fiction or poetry, abounds in references to astronomical facts that must remain more or less vague to the reader of little astronomical knowledge. The same need of astronomical knowledge is felt by him who would make himself highly intelligible in his daily intercourse with his fellow-men. It is here that the practical value and the cultural value become one and the same.

The inspirational value of astronomy is clear only to those who have made a reasonable study of the subject. All students of astronomy whether they have made an extensive study of it or have studied it merely for the purpose of getting a cultural knowledge of it, agree in saying that no other study in our college curriculums offers to the student so strong an incentive to continue his work, not only in astronomy but also in the various branches of study, as does the subject of astronomy. The student of astronomy will quickly realize the boundless possibilities of human knowledge,—a realization that can not fail to furnish the normal man the inspiration that shall lead him on and on in his search for knowledge.

Course I is a study of the fundamental facts and laws of astronomy and of the methods of astronomical research. It is general rather than technical in character, and does not aim to train scientists. The treatment is descriptive and non-mathematical. Course II is also descriptive but is devoted largely to the stars, nebulae, meteors, and comets.

Senior Year. First semester, three hours.

Senior Year. Second semester, three hours.

DEPARTMENT OF CHEMISTRY

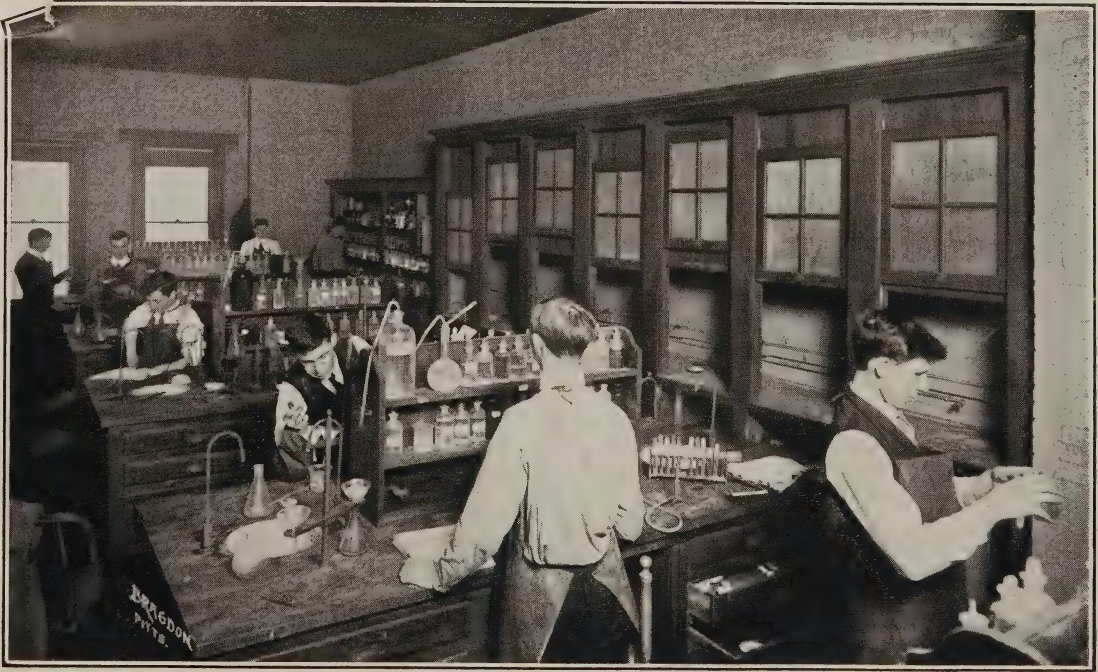
PROFESSOR FREEMAN

In the discussion of any college subject two questions arise; one has to do with the educational value of the subject, the other with the practical value. It is doubtless true that every subject possesses at least some of both values and it is often a matter of opinion which predominates. The so-called purely practical subjects are often of great educational value, and on the other hand purely educational subjects are often of much more practical value than is usually accredited to them. In these modern days much is written and said about culture, whatever that may mean, inferring that it should be the business of the college to confer culture. But if by culture something apart and distinct from scholarship is meant, then all such effort must eventually fail. Pure culture courses that do not aim to give a sound education are nothing more nor less than a "soft snap". They are pleasing but it is doubtful if they have any permanent value. If, on the other hand the term "culture" is intended to include sound scholarship, then the so-called culture courses are of great value. But culture means more than mere scholarship; it means an intellectual attitude, an appreciation, a refinement that mere knowledge can not give. Perhaps in the last analysis it is "a by-product" of cultured parentage and sound education.

Every subject, therefore, which makes for sound education should be studied with much zeal and enthusiasm by every student. We grow by doing. Everyone must be self educated; the only function of the college and teacher is that of the assistant. The problem is, then, how best to assist so that the college life may mean more and have a more important bearing upon the subsequent life of the student. Life is a continual test of problem-solving, whether in business or the professional field, and it is the duty of every college to give as much exercise and experience in problem-solving as is possible. The student should be taught to suspend judgment till he has possession of all the facts, and not to draw hasty conclusions. He must learn to make comparisons and to organize the facts and to follow clearly the steps leading to the laws and generalizations. In this way he becomes familiar with the scientific method.

Chemistry offers unusual opportunities for the student to learn the scientific method. The facts are first clearly presented, then organized and their relations pointed out. Next follow, logically, the steps leading to the establishment of the laws and generalizations underlying the science. In this way the student not only gets a good drill in the scientific method but a training in mental discipline as well.

There is much to be said in behalf of the practical side of the subject. Perhaps it will be sufficient to enumerate a few of the industries in which chemistry plays an important role. Its value to the steel and iron industry is well known and needs no comment. But it is, perhaps, not so well known that it is of as much usefulness to the following industries: glass, ceramics, cement, fertilizer, metallurgy fermentation, coal tar, textile, leather, etc. We may add that there is scarcely an industry in which chemistry does not find some application. Manufacturers are fast learning the value of



Chemical Laboratory
Qualitative Analysis

technical chemistry and are depending more and more upon the judgment of the chemist.

Westminster is exceptionally well equipped in the Department of Chemistry and each year is increasing the equipment by the addition of new and valuable apparatus. Students are supplied with all the apparatus necessary for performing the experiments outlined in any of the nine courses offered. The nine courses are planned so as to give the student who follows them a knowledge of the important branches of chemistry, a preparation for more advanced work in pure chemistry, and the ability to take up some technical line of work.

Courses I and II deal with the first principles of the subject, covering the field of general chemistry, and aim to prepare the student for more advanced work. They consist of lectures and quizzes supplemented by a four-hour-per-week laboratory course. The lectures are illustrated from time to time by typical experiments, usually differing from those performed by the student, but instructive and helpful. Recently lecture-room apparatus to demonstrate the laws of Dulong and Petit, of Gay Lussac, the vapor tension of liquids and solutions, the migration of the ions, and their relative velocities has been purchased. It is believed that such a course develops the powers of observation, cultivates the faculty of making careful analysis and of drawing correct conclusions, and gives an appreciation of the practical value of the subject.

Course III is of an entirely different nature and is largely experimental, but it is intended in the future to make the course partly class-room work. The latter will consist largely of discussion of the mass-action law and the theory of electrolytic dissociation. The laboratory work the first semester is devoted to a study of the cations, their separation into groups, and various methods of identification. During the second semester the anions are studied in a similar manner. Towards the end of the course the student takes up the analysis of various commercial products; then follows a short course in inorganic preparations. Thorough mastery of course III familiarizes the student with a great many chemical reactions which find constant application in his subsequent study of chemistry.

Courses IV, V, and VIII are devoted to quantitative determinations and give a thorough drill in careful manipulation. Both gravimetric and volumetric methods are studied, and are followed by a drill in technical analysis. Students who have completed these courses are prepared to fill a position in a commercial laboratory.

Courses VI and VII are devoted to the study of the compounds of carbon. The first course is exclusively class-room work extending throughout the whole year. The first semester is given to a study of the aliphatic hydrocarbons and their derivatives, the second to the aromatic compounds. Organic chemistry is not an easy subject; it requires much thought and a good memory. The lectures are made as elementary as possible and at the same time planned to give a complete survey of the field of organic chemistry. The second course is entirely experimental and may be taken in connection with, or follow, the first,—i. e., course VI. The student learns to identify the various elements found in organic compounds, and studies the methods of preparation and properties of typical members of the various classes of organic compounds.

Course IX is offered for the first time the present year. It is intended primarily for the advanced students. In the lectures are discussed the theories and the methods employed in this comparatively new field of chemistry. These lectures are supplemented by laboratory work which consists of determinations of densities, molecular weights, and conductivities. Recently freezing point apparatus for molecular weights, conductivity cells, ten accumulators and a good switch-board have been added to the equipment thereby making it possible to offer a good course in elementary physical chemistry.

It might be well to add that the department is supplied with a good assaying furnace and accessories and is ready to offer a course in assaying whenever it is requested. In connection with the department is a good reference library and reading room. The following journals are kept on file: Science, Journal of the American Chemical Society, American Chemical Journal, The Chemical Engineer, and Journal of Industrial and Engineering Chemistry.

DEPARTMENT OF PHYSICS

PROFESSOR SHOTT

PROFESSOR BRIDGMAN

Westminster College does not maintain a Department of Physics simply to furnish students mental discipline, although it ministers to this. Accurate observations must be made in order to get satisfactory results in the laboratory. A vigorous imagination is needed, and it must "dream straight" or abandon its creations. General truths are obtained by induction, and again knowledge is increased by deductive reasoning, but all these mental processes serve the main purpose of comprehending the principles of Physics. At the present time no amount of culture discipline will save a man from ridicule when he asserts that the current in the dynamo is caused by friction. We must demand that the knowledge of the elements of the sciences is a necessity in a scientific age, or give a definition of education that is ridiculous.

While we indorse heartily the movement in recent years to make the courses in Physics in secondary schools less technical by increasing the amount of descriptive work and by introducing more of the humanities of the subject by using the biographies of great physicists, we maintain that no course in Physics should be given merely for the flavor of the subject. In fact, we believe that no abiding or useful flavor is possible apart from a definite conception of the principles of the subject.

The courses of instruction are grouped as follows:—

1. Preparatory Physics.
2. Required College Physics.

Stock Room of Chemical Laboratory

3. Elective Courses.

4. Courses Preparatory to the Study of Advanced Physics, which include Mechanical Drawing, one year of Analytical Geometry and one year of Calculus.

One year is given to study of Elementary Physics. For this work there is a separate laboratory equipped with several complete sets of apparatus for the course as required in Millikan's and Gale's First Course and Laboratory Manual. This work is not in charge of tutors or assistants but is given by a regular professor of the college who has had experience in teaching this subject in High Schools and who has had college and university training. In this important and difficult study Westminster is fortunate in its effort to see that the introductory work is well done.

The College Course in Required Physics is made as flexible as possible in order to meet the needs of the students who come from the different High Schools of the country, and also to meet the needs of those who are looking forward to a scientific career. The course aims also to give such a knowledge of Physics as every well educated man should possess. The laboratory work is given in a large well-equipped room in the basement of Science Hall.

The Elective Courses cover a period of two years, and consist of lectures and laboratory work in Heat, Light and Electricity. These courses furnish the student who is looking forward to some professional or scientific career an opportunity to test his ability in the subjects that are fundamental for the work which he proposes to do in the future. These advanced courses are given to those only who have taken the advanced course in Mathematics, and the work is made of such a character as will be accredited in Technical and Professional Schools. Students who take this advanced work are eligible for scholarships in the Universities, and those who are proficient are recommended by the Department for the position of laboratory assistants whenever there is an opportunity to do so.

It is planned to add to the Department of Physics in the near future a well-equipped workshop in which modern courses in shop practice may be given.

COURSES OF STUDY

ELEMENTARY PHYSICS.—This course requires all of Millikan and Gale's First Course in Physics together with the laboratory exercises in the manual by the same authors.

Fourth year, four hours. PROFESSOR BRIDGMAN.

1. The lectures and recitations of this course are based upon Crew's General Physics. Four hours per week of laboratory work is selected from Blaker's Manual of Experiments. The course is limited to the study of Mechanics, Sound and Heat.

Junior requirement in all courses except in the classical. PROFESSOR SHOTT.

II. This course is a continuation of Course I, and is devoted to the study of Light and Electricity.

Required in the Scientific and Philosophical Courses. PROFESSOR SHOTT.

III. ADVANCED COURSE IN ELECTRICITY AND MAGNETISM.—The object of this course is to develop the fundamental principles of the Mathematical theory of Electricity and Magnetism and their more important applications. Franklin and MacNutt's "Electricity and Magnetism" has been used as a basis for the lectures and recitations. A course in laboratory practice has been arranged to accompany the lectures and recitations. This course is open to students who have completed Courses I and II and who have a working knowledge of the Differential and Integral Calculus.

Senior Year.
First semester, four hours.

PROFESSOR BRIDGMAN.

IV. ADVANCED COURSE IN HEAT AND LIGHT.—This course consists of two parts:—(a) Heat:—The aim of this part of the course is to give the student a comprehensive account of the science of Heat in both its theoretical and experimental aspects, so far as this can be done without the use of higher mathematics. Much stress is laid upon the necessity for due precautions in connection with thermometry. Recent achievements in high temperature measurements will receive consideration.

(b) Light:—The aim in this part of the course is to obtain an accurate and comprehensive knowledge of Geometrical and Physical Optics. The results of recent researches are discussed, in connection with important laws which they elucidate. This course is open to those students who have completed Courses I and II. A knowledge of the Calculus is helpful but is not required.

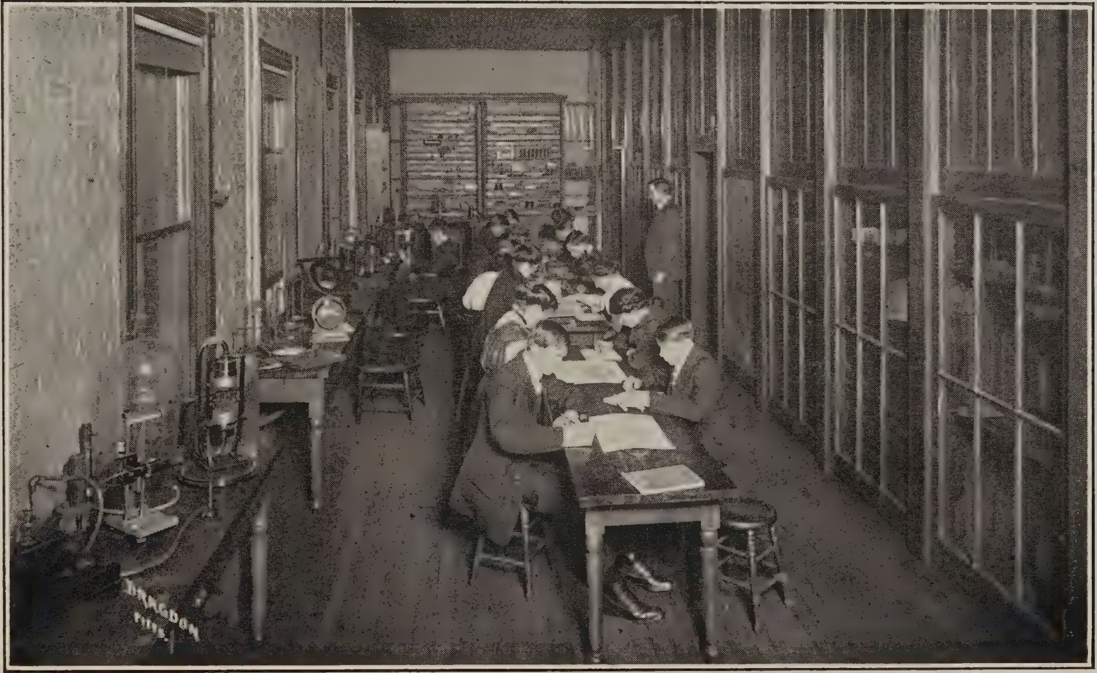
Senior Year.
Second semester, four hours.

PROFESSOR BRIDGMAN.

V. ALTERNATING CURRENTS.—An analytical and graphical treatment of the subject based on Bedell and Crehore's "Alternating Currents." The discussion of circuits containing resistance and self induction is first taken up and the equation of energy for such circuits is established. The work is then extended to circuits containing resistance and capacity, and finally to the general case of circuits containing resistance, self induction, and capacity. This course is open to students who have had Courses I, II, and III.

Senior Year.
Second semester, four hours.

PROFESSOR BRIDGMAN.



Physical Laboratory

DEPARTMENT OF BIOLOGY

PROFESSOR MILLS

THE PRACTICAL VALUE OF BIOLOGICAL INSTRUCTION

There exists in the minds of many people the impression that Biology is a subject dealing with matters which concern only the individual who is to become a physician, or specialist in botany or zoology. Nothing can be further from the truth than such a conception. Biology is preeminently a subject that concerns problems of human life; and whoever gains a knowledge of it from a humanistic view-point and is not indifferent to that of knowledge, will be able to live a more perfect life individually, and be a more useful member of society than the person who does not.

Health is essential to everybody. The relations of foods to the efficient work of the animal body, the importance of pure food and safe medicines, the cause and prevention of disease and the proper regulation of personal habits, together constitute a phase of Biology of direct importance to *every individual.*

Statistics show that annually thousands of people die in the United states of tuberculosis, typhoid fever, diphtheria, and kindred diseases; that there are 150,000 insane, and 51,000 blind; nearly all preventable and due to the lack of proper biological knowledge.

Health is essential; but pure food is essential to health. Not until the masses receive such a training as will enable them to comprehend the reasons for pure food laws, will we be able to get proper food laws enacted and enforced. No less important for public health are safe medicines. One of the greatest sources of danger to people in poor health is the prevalence of a certain class of proprietary medicines. The manufacturers of these medicines are responsible for many deaths, and for imposing destructive and debilitating habits on many who turn to them for relief. Again it is evident that a course in Biology, teaching the temperate care of the body and the necessity of carefully choosing what shall be put into it, is of inestimable value.

Not only is the physical well-being of man greatly enhanced by a knowledge of Biology, but his economic welfare as well. The economic welfare of the people rests upon the economical utilization and husbanding of natural resources. The conduct of the citizen in relation to the natural resources of his community or nation will depend to a very large extent upon his realization of the importance of the various factors to the life of the community and the members of the community. Such a realization can be acquired only by learning in a proper way of the relations between man and the living part of his environment.

Besides furnishing much useful knowledge concerning life and life processes, Biology gives a culture and a discipline which is in no way inferior to that derived from other subjects. It furnishes intellectual stimulus; develops a love for nature and its Author; gives a broad outlook upon life; and leads the student to respect and to have sympathy for other kinds of life. It also gives training in accurate observation and develops the habit of accurate and independent thinking.

BIOLOGICAL LABORATORY

The biological laboratory was removed a year ago from the second floor of Science Hall to better adapted quarters on the first floor. During the past two years several hundred dollars have been expended for new equipment. This equipment includes new tables especially adapted for classwork, modern microscopes, bacteriological apparatus, charts, and material for demonstration purposes.

COURSES

I. General Biology. This course is largely dinamic, and modeled after the course in General Biology established by Dr. C. F. Hodge in the Collegiate Department of Clark University. Plants and animals are studied as *forces in nature.* The types for study are selected with this end in view. The purpose of the course is to furnish students with a knowledge of living things, insects, birds, and other common animals, trees, and native plants, that will make them good citizens and enable them to think well and act well concerning the problems of everyday life. The types selected are studied alive and at work under natural conditions when possible. They are also studied by means of dissection and the microscope in order that the student may be able to pursue more specialized work in botany and zoology. Lectures, recitations, and laboratory.

Throughout the year, four hours.

II. Botany. The morphology, evolution, and classification of plants. Representatives of the great groups of the plant kingdom, algae, fungi, mosses, ferns, and flowering plants, are studied upon the basis of their relationship by descent. Open to students who have had elementary botany or Course I. Lectures, recitations, and laboratory work.

First semester, three hours.

III. Botany. Plant Physiology and Ecology. This course is largely experimental. In order to correlate as much as possible the student's laboratory studies with natural environment, field excursions will constitute an important feature of the work. This course should be preceded by Course II. The Course in General Chemistry is also desirable. Lectures, laboratory and field work.

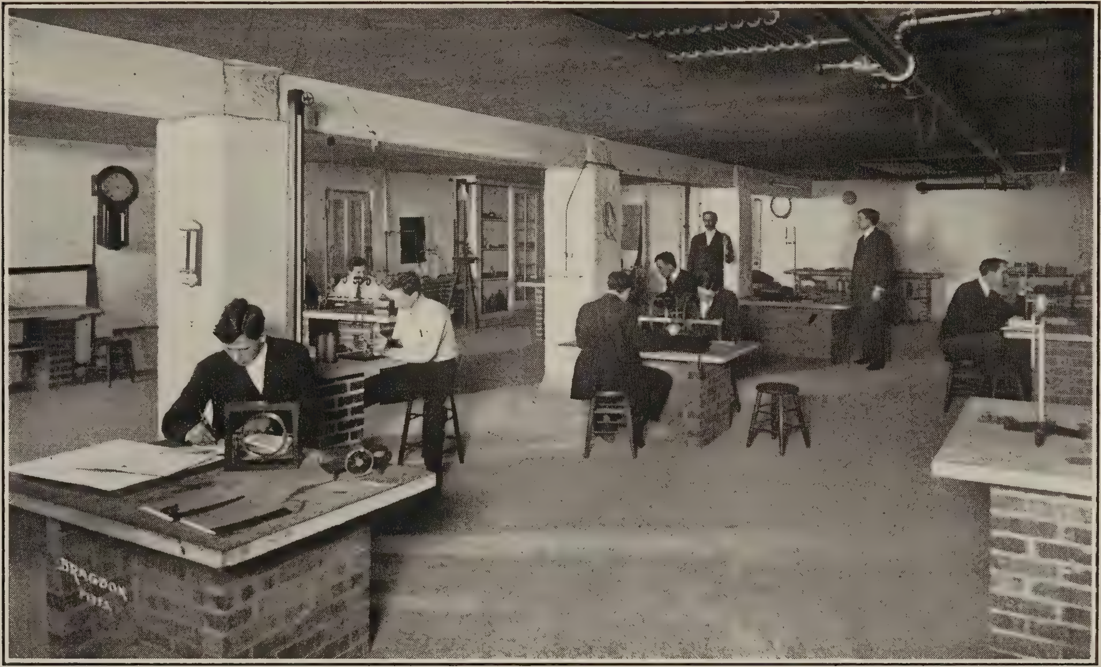
Second semester, three hours.

IV. Zoology. A comparative study of selected type forms, invertebrate and vertebrate, including structure and development, habits, ecology, classification, and distribution. In order to give the student a working knowledge of the principles of classification some systematic work will be undertaken with birds and insects. In the second semester, the theory of organic evolution is set forth and its present status indicated. Open to students who have completed Course I. Lectures, recitations, and laboratory work.

Throughout the year, three hours.

This course will regularly alternate with Course II. However, should there in any year be a demand for the alternate course and not for the one offered, the course desired will be given.

V. Animal Physiology and Histology. This course is offered primarily to meet the needs of students intending to study medicine. It treats of the structure, functions, and general hygienic relations of the human body, as illustrated by selected animal material. Train-



Physical Laboratory.

ing is given in the technique of dissection and preparation of tissues for examination with the microscope. Open to students who have completed Course I. Lectures, recitations and laboratory work.

First semester, four hours.

VI. Embryology. This course supplements Course IV. The student follows carefully the development of the frog and the chick, and studies serial sections of mammalian embryos. The preparation of slides and specimens for study is a distinctive feature of the work. Lectures, collateral reading, and laboratory work.

Second semester, four hours.

THE SUMMER SCHOOL

JUNE 21—AUGUST 4, 1910.

Not only within recent years but for many years past, in fact from the inception of the public school system in this country, there has been persistent agitation for better teachers. In no other way may the efficiency of a school be measured so accurately as by the competency of its teachers. It is vain to hope for desirable results in school work without these. Material equipment—better buildings, appliances, laboratories and playgrounds, a longer school year, better grading, more intelligent supervision, better text books—all these contribute in a marked degree toward better work in the schools. The public has generally responded to the demands for these improvements.

But more than this is required and the public demands more than this, and is willing to pay for what it gets. Recently in conversation with a college bred man, the writer asked him, "How many teachers were there at —————— college when you were in attendance there?" He promptly replied, "Two." An examination of the college catalogue would reveal that the faculty comprised twenty or more teachers but for him there were but two—these were to *him* real teachers who influenced him. Garfield's familiar estimate of Pres. Mark Hopkins as a teacher is but, in other phrase, the conviction which every alert youth has formed with reference to one or more of those who are or have been his instructors. It is not difficult to find many men and women now occupying prominent positions in the vocations of commercial, professional or social life and doing with joy and with power their full share of the world's work who can point definitely to the teacher who by force of intellect, skill in imparting or sympathy in manner or these all combined gave to them the first aspirations for knowledge and the first real ambition to achieve. On the other hand many unfortunately are able to account for their lack of interest and progress and their final premature withdrawal from school through the monotony and drudgery of the school room unrelieved by any stimulus to interest which can only come from the real live teacher.

Differences of opinion exist concerning the training of the teacher. No one claims that all the necessary qualifications of the teacher can be induced by training. It is acknowledged that personality and natural adaptability are most important factors and that some can not be good teachers and others can not be poor teachers. It is susceptible of proof however that either of these may be greatly improved by training. Better teaching, it is true, is a question of better knowledge of the subject matter to be taught, but it is more than this. The growth of departments of education in conservative colleges, and of schools of education in universities, such as are proposed for this state in the school code now pending in the legislature, is evidence that it is believed that teachers can be taught—not only the content of bodies of knowledge but also a knowledge of the conditions and methods whereby the subject matter may most effectively be presented. All normal schools are based upon the same fundamental assumption.

A recent writer on educational problems, particularly the problems connected with secondary schools,—though here his remarks are applicable to all grades of schools—mentions three cardinal qualifications of the teacher:

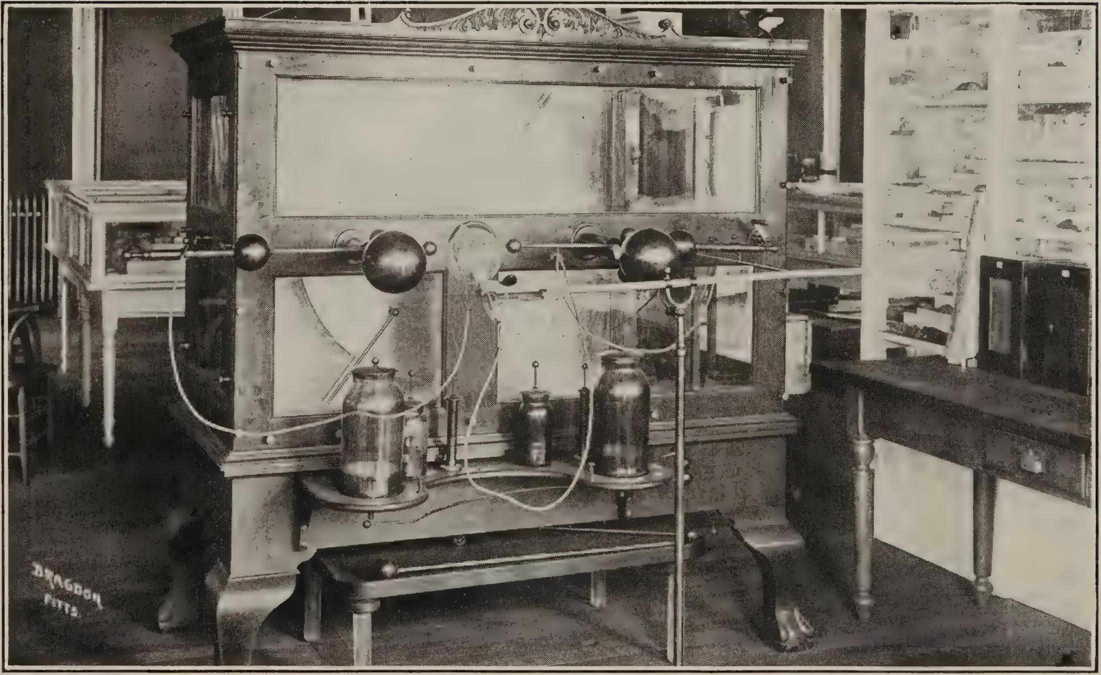
First: A thorough knowledge of the subject matter to be taught.

Second: Enthusiasm for his subject.

Third: Enthusiasm for his pupils.

He must have far more extensive and profound knowledge of his subject than he will ever be expected to teach. By this, it is reasonable to say, that his enthusiasm for his subject and for his pupils will be greatly accented. It is the province of the college, the high school and, to a degree, of the normal school to give that instruction in subject matter which may equip the teacher on the intellectual side. The professional schools where methods are taught can add a most wholesome and valuable supplement to this knowledge. The teachers institute, the round table conference, and the reading circle are also potent aids of which no live teacher will fail to take advantage.

For teachers already in the service who desire to equip themselves to do better work and to secure promotion and better salaries, and for others who are expectting to take up the work of teaching, the summer school offers many advantages. This is a recent institution and its growth has been remarkable indicating that it has met a real need. It is held at a time of the year when teachers are free from school room duties; it combines academic and professional studies; it brings together a class of students having a similar definite purpose



Physical Laboratory
X-Ray Machine

and there is the consequent professional spirit pervading the whole; it is informing, stimulating and, with it all, inexpensive.

Probably a majority of the colleges offer summer courses for terms ranging from four to twelve weeks in which a large choice is offered among academic and professional subjects. The combined enrollment in these schools is hardly less than that of the regular school year. The demand is for better teachers, for teachers who aspire and grow, who have the professional spirit and are desirous of improving for their own sake and for the sake of those whom they teach. School boards are making larger demands upon their teachers for skillful and inspiring work; they are scrutinizing more closely the teachers' qualifications; they are willing to grant larger compensation but they expect also improved service. State legislation affecting salaries has been distinctly favorable to teachers; other legislation is in prospect which will materially add to the requirements for teachers.

Among the changes in school law recommended by the new code now pending in the legislature of this state are several which will definitely affect the qualifications of teachers. It is proposed, with practical certainty of adoption, that a provisional certificate shall be valid only for five full terms' teaching. The teacher must meantime get ready to acquire the professional certificate or be eliminated from the ranks of the profession. For the professional certificate higher marks are required in the common branches and an examination must be sustained in any two of the following branches: Vocal music, drawing, English literature, plane geometry, general history, physical geography, elementary botany, elementary zoology, or elementary physics, and "The applicants shall also satisfy the superintendent by oral or written tests that they have carefully and intelligently read two of the books on pedagogy recommended by the State Board of Education." The advantages of the professional certificate to the schools are apparent in the superior instruction and management; to the teacher who holds such certificate, the law provides higher compensation. The summer school affords the teacher an opportunity to prepare for the examinations for either the provisional or professional certificate and yet leaves him free to continue his work during the regular school term.

But the college in its special summer session finds opportunity to do much more than to prepare teachers for the common schools. There are teachers in the high schools and academies who feel the need of adding to their preparation for their work. Teachers of Physics and of Latin, for example, whose training has been limited to the usual college courses in these subjects, may possess the requisite information for teaching these branches. Generally, however, they are conscious of the fact that their success is limited by lack of grasp of proper methods of presenting their subject and that it would be of great advantage to them to "work through" again the principles of their subject under the tuition of one who is not only thoroughly versed in the content of the subject but also skilled in the theory and practice of presenting it to others. To these the college summer school may confidently offer its help.

The school faculty can still further be useful to several other classes of students:

To college or high school students who are delinquent in one or more branches and desire to "make them up" in order to secure regular standing.

To students of the grades who need to complete some work and pass examinations in order to secure promotion.

To any who desire to apply for admission to technical schools or to take the civil service examinations and desire to remove certain deficiencies or to make fuller preparation for the same; and any others who desire to enlarge their knowledge of the branches offered.

Westminster College purposes offering the advantages outlined above, in a summer term of seven weeks beginning June 21, 1910, and closing August 4. The organization is sufficiently advanced to justify announcement of the following courses to which others will be added in case a sufficient demand is made for them:

I. The so-called common branches: United States History, English Grammar, Arithmetic, Civics, Geography, Physiology, Orthography, Public School Singing. See "Outline of Courses in Common Branches."

II. Pedagogy: Two courses will be offered. Course 1. Elementary Pedagogy; Course 2, Educational Psychology. See "Outline of Courses in Common Branches."

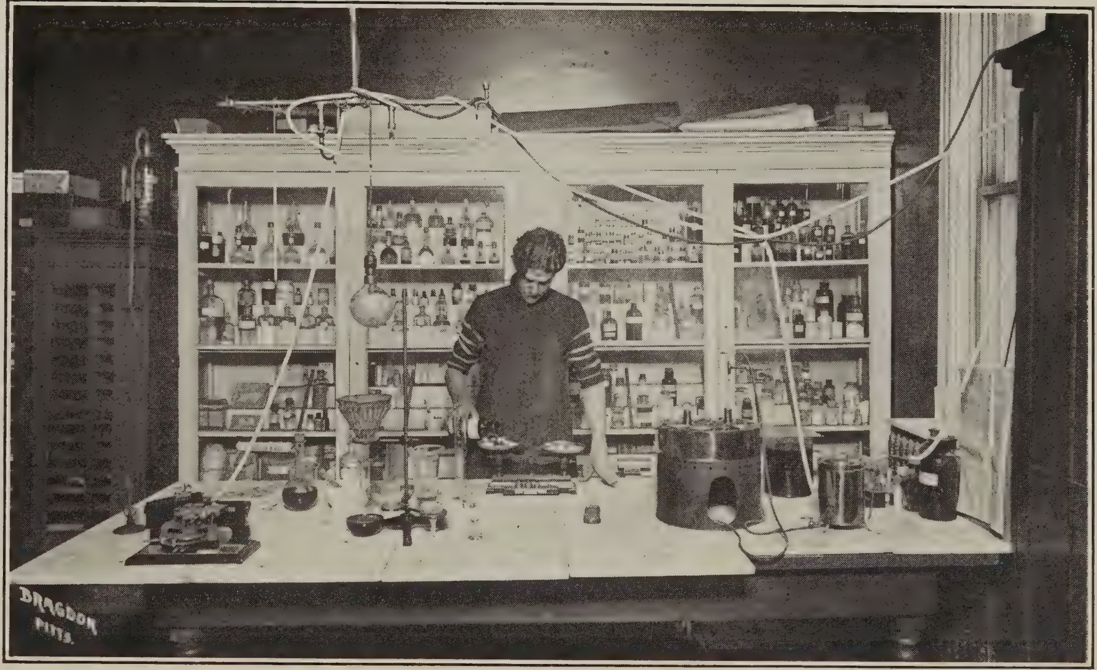
III. The Model School. Grades I-VI, conducted by a critic teacher of high rank who will have entire charge, assisted by such competent help as she may select. See "Model School."

IV. High School Physics with complete laboratory course. Students and teachers in this course will have access daily to the well equipped Physical laboratories in Mary Thompson Science Hall. The courses will be given by an instructor who has taken his graduate work in one of the leading state universities and has had successful teaching experience in high school and college. The student and prospective teacher will be encouraged to acquaint himself with the use of the apparatus indicated for each experiment and will be given such expert assistance as may be required to enable him to master the subject and qualify him to teach it.

High school pupils who have taken complete or partial courses in Physics and desire to do additional work in order to get credit for college entrance will find this course adapted to their needs. Teachers of Physics in High Schools and Academies who desire to do advanced work apart from the regular class will be afforded the opportunity which they desire.

V. Secondary School Latin. In this course, an attempt will be made to illustrate with the class the best methods of presenting First Latin, Caesar, Cicero and Virgil, and to direct to the solution of any difficulties which pupils may find in their study or teaching of these courses. If the class so elects, much time will be given to the discussion of matters of syntax or to reading of large portions of one or more of these authors. This course is designed not only as a review of these subjects but also is intended to be helpful to those who teach them.

VI. Physical Geography and Elementary Geology. A brief text-book and lecture course supplemented by frequent field excursions. The rock formations and



Biological Laboratory

physical features of the neighborhood will be studied.

VII. Nature Study. A general course, with special study of birds and trees. Lectures and field excursions. In this and the preceding course large use will be made of the camera and the magic lantern; instruction will be given in photography in connection with these courses, the college possessing a well equipped gallery. The instructor in charge of courses VI, VII and VIII is a recent graduate student under the eminent Dr. Hodge of Clark University.

VIII. Agriculture. This course is designed to equip teachers in public rural schools and township high schools to teach Elementary Agriculture as required by the new school code.

IX. Other branches: Students will be afforded an opportunity to pursue courses in Algebra, Geometry, Botany; in English, Preparatory Greek, Elementary German, and in General History—in class if a sufficient number apply, otherwise under private instruction, for which rates and hours will be arranged. Other secondary school and college branches will be offered under private instruction. Correspondence is solicited regarding these. See "Academic Branches."

In addition to the above formal courses, it is the purpose of the college to provide the following:

First, a weekly Round Table at which successful city and county superintendents will preside and lead in the discussion of vital topics in local or general school management. See "Round Table."

Second, a weekly lecture on topics of general or professional interest by members of the college faculty or by men successful in business and professional life.

The course of lectures on Applied Psychology, to be given by Dr. Scott F. Hershey, will prove of great value to teachers in the public schools and Sabbath schools. We are very fortunate in securing his lectures for our school.

Reverting to the formal courses brieflly outlined above we may add that in course I it will be the aim of the instruction to cover the entire subject as outlined in the common school text-book and to assist the teacher by illustrating the best methods of presenting each topic and by solving any difficulties which are apt to arise in the teacher's work. The teacher or prospective teacher who takes these courses ought to be able to pass a creditable examination for a teacher's certificate and to add largely to his ability to teach.

THE CALENDAR

The Summer School of Westminster College will open Tuesday, June 21st, and close Aug. 4, 1910.

Thursday and Friday, August 4-5, examinations of applicants for teachers' certificates, provisional and professional, will be conducted in New Wilmington by Supt. W. Lee Gillmore of Lawrence County, and Supt. F. F. Foltz of Mercer County, and Supt. R. S. Penfield of Butler County, and Supt. D. C. Locke of Beaver County.

The Model School begins Tuesday, June 28 and closes Saturday, July 23.

TUITION

Tuition for normal branches, term of seven weeks..	$10.00
Tuition per week for five weeks or less....................	2.00
Tuition, course in physics including laboratory fee..	15.00
Tuition, Model School four weeks.......................	8.00

Tuition in branches included in Course VIII will vary according to the number of applicants in each subject. Hours and rates will be arranged. Correspondence is solicited in regard to these branches.

BOARD AND ROOMS

Board and room for ladies may be obtained at the Hillside, the beautiful Ladies' Dormitory, at prices ranging from $3.50 to $5.25 per week according to location of rooms, private baths, etc. Pro rata reductions will be made for week end absences.

Board and room in private families may be had for $4.00 with reduction for week-end absences.

At least two clubs will be in operation at which meals will be furnished at actual cost of provisions and service. Those who adopt this plan of boarding may be able to reduce the cost below the figures stated above.

TEXT-BOOKS

Teachers are urged to bring with them such text books as they possess. The various subjects will be presented by topics, and, with few exceptions, it will not be necessary for the students to purchase additional books.

COURSES IN COMMON BRANCHES

The instructors will keep constantly in mind the two main objects for which these courses are given: First, to equip the teacher with that knowledge which will qualify him to pass a creditable examination and,

Second, to illustrate the best methods of presenting these subjects to pupils of the various grades.

Frequent reviews will be given and an effort will be made to master the chief difficulties presented by each subject. The time will be ample for the completion of the various branches.

1. ENGLISH GRAMMAR:

The instruction will be based upon some text book in general use and will include a careful study of the parts of speech and the rules of syntax. The diagram will be employed occasionally and much practice will be given in sentence building. Students and teachers will be encouraged to state their difficulties and no points of importance will be neglected in the discussions.

2. GEOGRAPHY:

The course will include the equivalent of the Natural Advanced Geography, or of Roddy. The college possesses apparatus available for the successful explanation of the principles of the Mathematical Geography. By the employment of constant drill, the facts of Descriptive and Political Geography may be firmly fixed in the memory. Thoroughness will be insisted upon in this course.

3. PHYSIOLOGY:

The main facts of this science will be treated with the use of Overton's Physiology as a guide. Constant

Biological Laboratory

references will be made to other texts. The time will be ample to admit of a number of laboratory experiments illustrative of the various laws of this science.

4. ORTHOGRAPHY:

The course will be brief, two periods a week being given to this subject. It will be presented by the use of a brief text and notes by the teacher.

5. CIVICS:

This will be a text book and lecture course and will be closely correlated with United States History. An attempt will be made to arouse interest in the teaching of this subject which has been much neglected in the public schools.

6. PUBLIC SCHOOL SINGING:

A brief period daily will be devoted to this subject; chorus, study of the rudiments, and selections of songs suitable for use in various grades, and the high school.

7. PEDAGOGY: COURSE 1, ELEMENTARY PEDAGOGY:

This course seeks to answer the question, "What concrete methods and devices should the school employ in view of the well known elementary facts and principles concerning sensation, perception, apperception, memory, imagination, judgment, reasoning, will, emotion, habit and instinct?" An outline of the course will be furnished by the instructor and the pupils will be expected to bring to class each day a written statement of the work of the preceding recitation. The course is intended for beginners and will be made concrete with abundant illustrations from the lives of public school pupils and the subjects which they study.

COURSE 2, EDUCATIONAL PSYCHOLOGY:

This course is intended for teachers of experience who are somewhat familiar with pedagogical literature. The work will be based upon chapters selected for study from the works of Thorndike, James, Bagley and Horne. An effort will be made to adapt the work to the tastes and advancement of those who enroll for it.

8. MILNE'S PRACTICAL ARITHMETIC:

This course will consist of a general review of arithmetic as a preparation for the teachers' examination. In connection with the solving of problems much attention will be given to clear statements of definitions and principles. Some special attention will be given to percentage and its applications and to mensuration. Making of problems by the students will be a feature of the work. A course in advanced arithmetic will be offered to experienced teachers.

9. MACMASTER'S SCHOOL HISTORY:

A general review is planned to be of service to those who are preparing to take the teachers' examination. Any good text book may be used but the order given in MacMaster's text will be followed. It is expected that the events of history will be so related to each other and the main outlines of the periods of the subject as to reduce the burden upon the memory to a minimum.

THE ROUND TABLE

A series of weekly Round Tables conducted by successful city and county superintendents will be a very important feature of the school. Teachers will not fail to realize the value of these conferences. It will be possible by this means to discuss a number of the most vital problems relating to the work of the school. Whatever may be gained by attendance upon a well conducted teachers' institute can be secured even more readily from these conferences. The discussion will be led by experienced school men, and every teacher will have an opportunity to ask questions and participate in the discussion. The fullest freedom of expression will be encouraged. Subjects for discussion will be chosen from the following:

1. The Problem of Grading.
2. General Discipline.
3. The Teacher and the Community.
4. The Teacher's Reading.
5. The Social Aspect of the School.
6. School Law Applying to Teachers.
7. The Course of Study.
8. The School Room; Its Care, Ventilation and Decoration.
9. Literary Training in Connection with the School.
10. The Recitation.

It will be noted that a wide range of school activities is here presented. Among the well known educators who have consented to preside at these conferences are the following:

Prof. W. Lee Gilmore, Supt. of Lawrence County Schools.
Prof. R. S. Penfield, Supt. of Butler County Schools.
Prof. F. F. Foltz, Supt. of Mercer County Schools.
Prof. D. C. Locke, Supt. of Beaver County Schools.
Prof. John A. Gibson, Supt. of Butler Schools.

Prof. Benj. G. Graham, Prin. High School, Greensburg, Pa.

Dean J. Brad Craig, Prin. of Beaver Public Schools.

The high professional standing of those in charge guarantees much profit to all who attend. School officers and parents are cordially invited to attend these Round Table discussions.

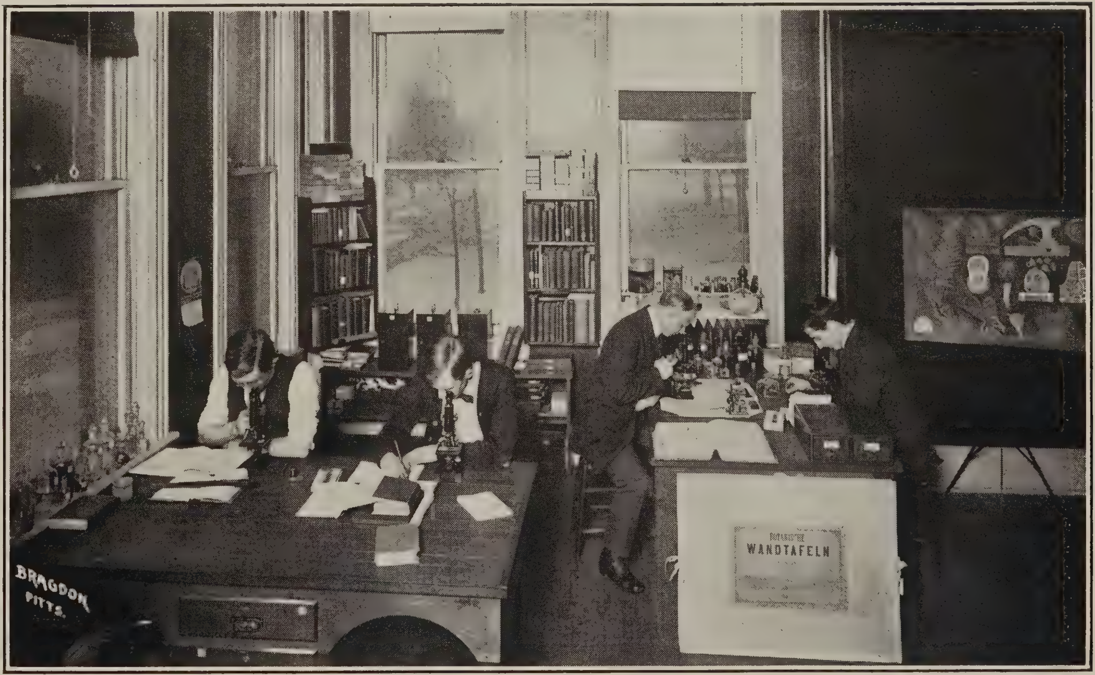
THE MODEL SCHOOL

This school will consist of six grades of the school children of New Wilmington, and be in charge of a competent critic teacher and assistants. The critic teacher will give instruction in methods to those who take the model school work and then take the class to the model school to see the application of the methods just discussed. While this course is primarily for beginners it is expected that it will also be of great value to teachers of experience.

The tuition for this course will be two dollars per week, but students will be allowed to take free of charge such other work as their time and schedule will permit. Students who pay full tuition for the term will be permitted to visit the model school free of extra charge.

ACADEMIC SUBJECTS

The Westminster Summer School, while designed primarily to benefit teachers and prospective teachers, also offers instruction in Secondary School and College subjects. Many high school and college students desire an opportunity to make up one or more branches in order to secure regular standing. Others who contemplate entering technical schools or taking civil service examinations will find opportunity to pursue such branches as



Biological Laboratory

they may need for their purpose. Our facilities are such that competent instruction is offered in Latin, Greek, Algebra, Geometry, Elementary German, General History, Preparatory English and the Academic Sciences. Classes will be organized for three or more applicants for any one branch and private instruction will be given to any who may apply. Hours and terms will be arranged. It is desirable that those who purpose taking any of the subjects mentioned above arrange for the same by correspondence or interview prior to the opening of the School. Students are urged to pursue not more than one, or in case of review, not more than two subjects. The principals will give a certificate of work done.

GRADE SUBJECTS

Pupils in the seventh and eighth grades who have for any reason failed of promotion and who desire to remove the condition will find classes suited to their needs. Classes will be organized in the common branches adapted to the wants of such applicants. The work will, as largely as possible, be directed to the individual need and will be done with great care so as to meet the requirements of city superintendents. Correspondence with parents and with pupils of this grade is solicited.

PROFESSIONAL CERTIFICATES

The instruction of the school will have in view the interests of those who teach and will aim to qualify them to render better service and to secure deserved promotion. It will specially recognize the interests of those who are eligible to apply for the professional certificate. Teachers who have had the requisite experience can not fail to realize the advantages, ***to them and to the school***, that may be derived from the professional certificate. This school has the hearty endorsement of the county superintendents of Lawrence and neighboring counties, and will endeavor to co-operate with them fully in their purpose to strengthen the teaching force of the schools under their supervision.

EXAMINATIONS

The Summer School will conduct no examinations but written lessons may be required from time to time. At the close of the term, the county superintendents of Lawrence, Mercer, Butler and Beaver Counties will conduct examinations for teachers' certificates. The principals of the Summer School are grateful to these superintendents and to others for valuable suggestions regarding the kind of courses and instruction best adapted to the needs of their teachers. An earnest effort will be made to prepare teachers already in the service to do better work and to win promotion, and prospective teachers to pass a creditable examination and to succeed in the school room duties from the first.

THE FACULTY

The following instructors will have charge of the school; others will be added as demands for special studies shall develop.

ROBERT MCWATTY RUSSELL, LL. D.,
President of Westminster College.

J. BRAD CRAIG, A. B.
Principal of Beaver Public Schools,
Dean of Summer School.

JOHN A. SHOTT, A. M.,
Pedagogy, Arithmetic, U. S. History.

WILLIAM W. TROUP, A. M.,
Latin, English Grammar, Geography.

BENJAMIN W. BRIDGMAN, A. M.,
Physics, Physical Geography, Higher Mathematics.

OWEN W. MILLS, A. M.
Physiology, Nature Study.

ANNA HOUSTON, A. M.,
of the Butler Schools,
Orthography and Assistant in Common Branches.

T. D. BROWN
Civics and History.

ADA M. ELLIOT,
English History.

REV. SCOTT F. HERSHEY, PH. D., D. D.,
Pastor of First Presbyterian Church, New Castle, Pa.
Lecturer on Applied Psychology.

The excellent class rooms, the shady campus, the beautiful Hillside Home for girls, the facilities for gymnasium practice and outdoor sports, the well equipped laboratories and libraries to which students will have access under certain necessary restrictions—all combine to make this a pleasant place in which to spend a part of one's vacation in profitable study and recreation.

Correspondence is invited from school officials, from students and teachers and others interested in the courses herein outlined. We shall take pleasure in furnishing any information desired regarding the school.

Address the President,

ROBERT M. RUSSELL, LL. D.,
New Wilmington, Pa.

or the Dean,

J. BRAD CRAIG,
Beaver, Pa.

UNIVERSITY OF ILLINOIS-URBANA
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